EEDTS Pro Budget Booster

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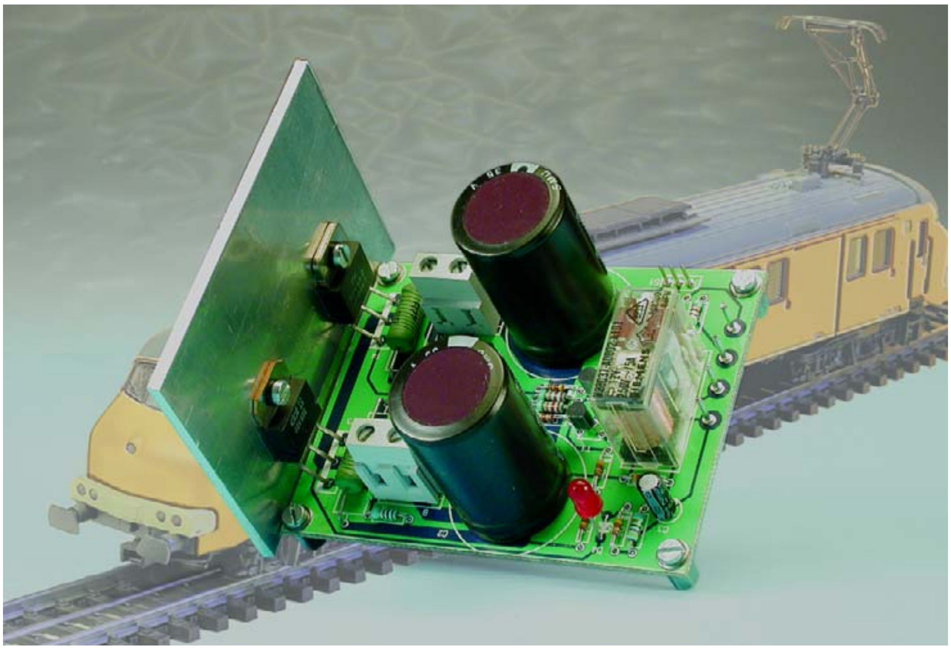


S. van de Vries

For many people, the existing EEDTS booster, which has an output current capacity of 10 A, is perhaps a bit too much of a good thing. Although the existing booster is significantly superior to the 'Budget Booster' described here in many respects, the latter booster is more suitable for making the transition from analogue to digital control for your model railway. You can even use your old reliable train transformer (AC) from the analogue era to power the new booster!

Note: although the Budget Booster can also be used with other controllers, since a symmetric signal can be connected to K1 and K2, this circuit is intended to be connected to the EEDTS Pro controller. The connectors are labelled to match the connectors on the EEDTS Pro controller board.

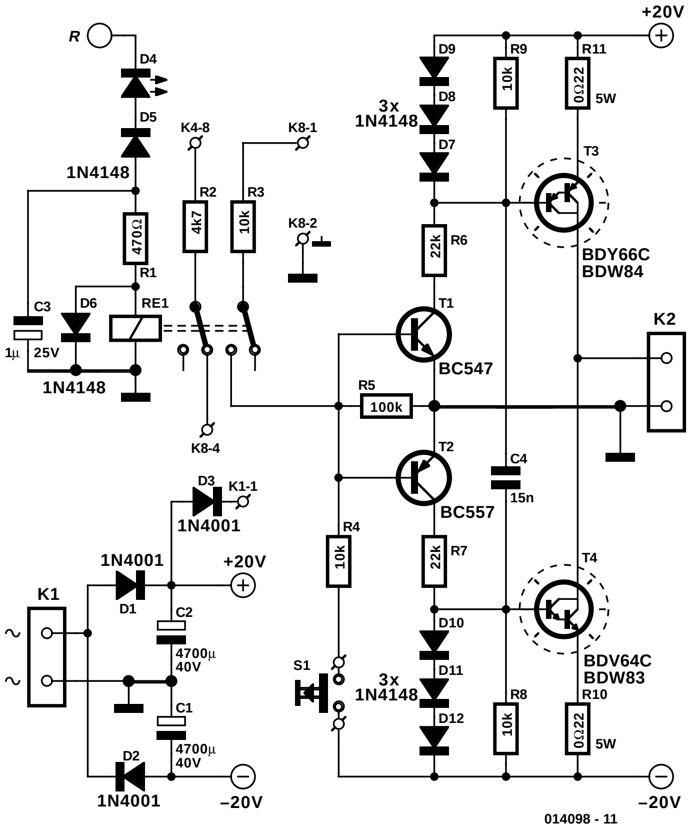
As can be seen from the schematic diagram, the output is driven by a complementary pair of Darlington transistors (T3 & T4). These Darlingtons are wired somewhat differently than in the 10-A booster, with the load resistors R10 and R11 being placed in the emitter leads. This has the advantage that the two collectors are connected together. Since this junction is also connected to the mounting tabs, the two Darlingtons can be fitted to a heat sink without using insulating washers. A small aluminium plate (3 × 8 cm, 3 mm thick) provides a more than adequate heat sink.

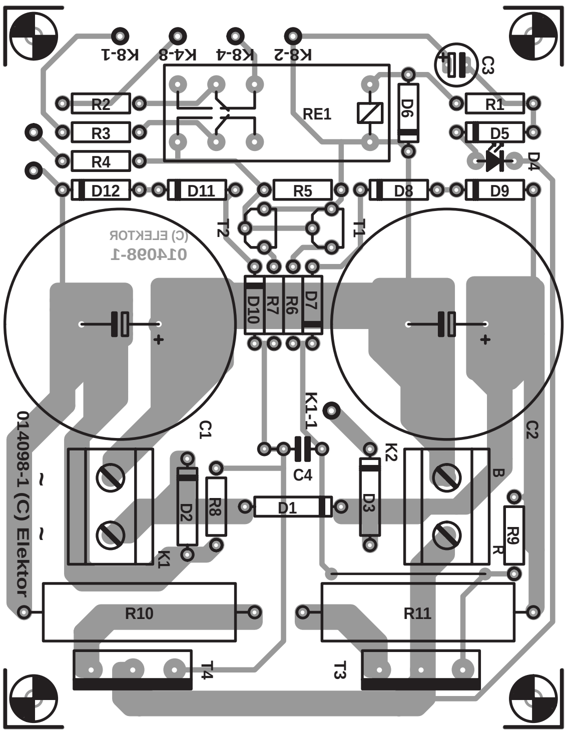
The combination of R10/R11 and diodes D7–D12 provides current limiting for the booster. Current limiting will take effect at a voltage drop of approximately 0.6 V, which means at a current of approximately 2.5 A with the resistor value used here (0.22 Ω).

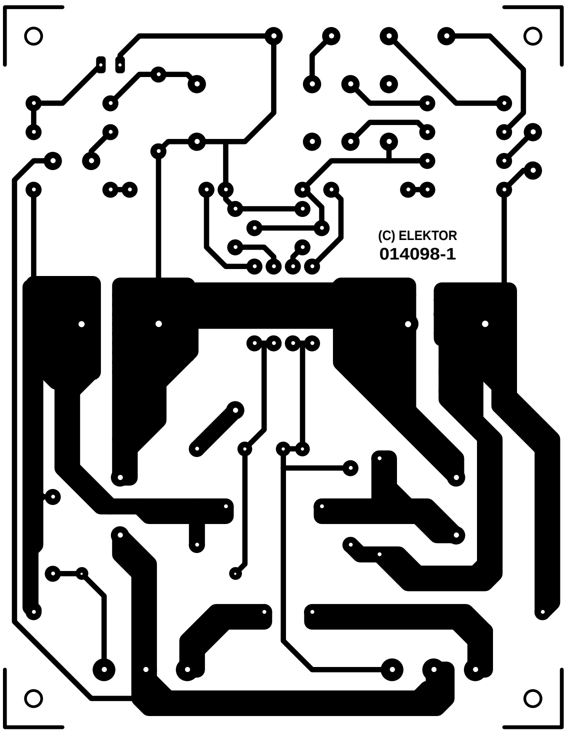
The Darlingtons are driven by a complementary pair of normal transistors (T1 & T2). In the absence of an input signal, both of these transistors will be cut off, and the Darlingtons will also not conduct, causing the output to be in a high-impedance state.

Besides current limiting, the booster also features a disable circuit built around relay RE1. As long as a negative voltage is present at the output of the booster, this circuit will allow the booster to be driven (the Motorola format is negative most the time, so the input signal will cause the output to be almost continuously negative). If the output is shorted, the relay drops out, disconnecting the control signal and causing the output to assume a high-impedance state. Once the short has been removed, the relay can be re-energised by briefly applying a negative input voltage (by pressing S1, the 'Go' button). After this, the input signal can again drive the booster.

Capacitor C3 provides a certain amount of delay to prevent the relay from dropping out too quickly. An LED in series with diode D5 is provided as a short-circuit indicator. This LED will be illuminated when the booster is out-







COMPONENTS LIST

Resistors:
R1 = 470Ω
R2 = 4kΩ7
R3,R4,R8,R9 = 10kΩ
R5 = 100kΩ
R6,R7 = 22kΩ
R10,R11 = 0Ω22 5W

Capacitors:
C1,C2 = 4700µF 40V radial
C3 = 1µF 25V radial
C4 = 15nF

Semicondcutors:
D1,D2,D3 = 1N4001
D4 = LED
D5-D12 = 1N4148
T1 = BC547
T2 = BC557
T3 = BDY66C
T4 = BDV64C

Miscellaneous:
K1,K2 = 2-way PCB terminal block, lead pitch 7.5mm
S1 = on/off switch
RE1 = 12V, changeover contacts, e.g., Schrack V23037
PCB, order code **014098-1**

putting a signal and extinguished when there is a short.

If desired, a pushbutton switch can be wired in series with R1 to serve as an emergency stop switch. This addition can be easily made by fitting R1 vertically on the circuit board. In accordance with an unwritten convention, you should use a green pushbutton for the Go switch and a red pushbutton for the Stop switch.

The circuit has a remote short-circuit indicator in the form of resistor R2 connected to relay RE1. This allows the new controller to sense whether there is a signal on the track.

A 16 V / 32 VA train transformer connected to K1 provides an excellent source of power. Symmetric DC supply voltages are derived from the transformer secondary in a simple manner using D1, D2, C1 and C2.

With a small modification, the EEDTS Pro controller can also be powered from the train transformer by fitting a small heat sink (2 × 3 cm, 2 mm thick) to the 5-V regulator IC on the controller board and tapping off the supply voltage via D3.

Most of the space on the printed circuit board for the booster is taken up by C1, C2 and RE1. Since the actual circuit consists of only a few components, the board can be built relatively quickly.

(014098-1)